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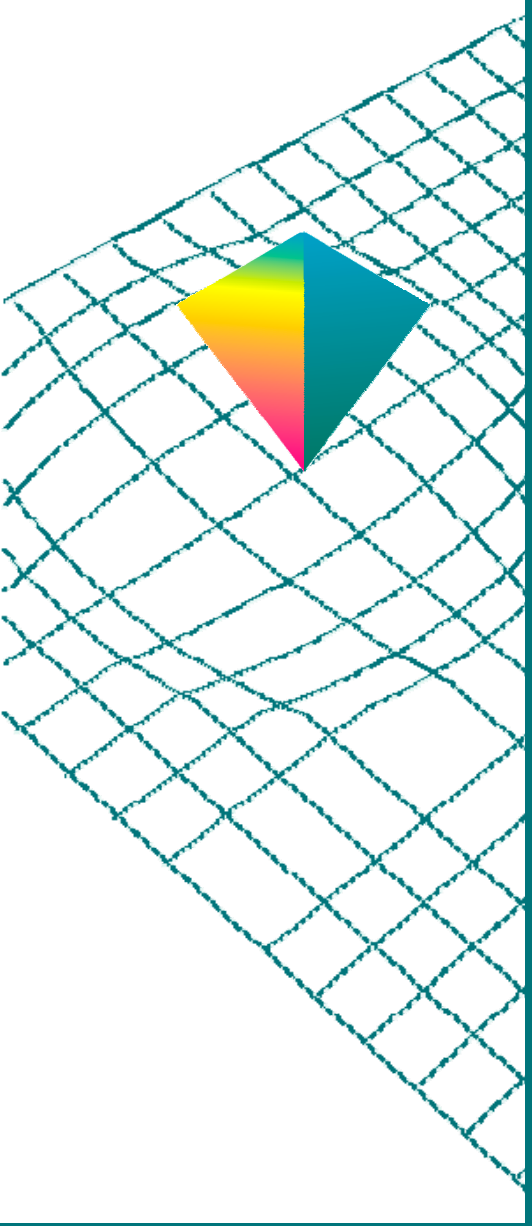
September, 19-23, 2005



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A. Balkovoy / G. Slivinskaia / A. Tolstenko

Feedback Signals Processing in Direct drive

ABSTRACT

The two methods of current and position sensors processing using TMS320F28XX based direct drive controller are performed and compared – sensors data input in PWM (pulse-width-modulation) pause and oversampling techniques.

Fig. 1 performs direct drive digital motion system. The two processors structure is caused by the complexity of functions of the controller module. It allows managing using special command set via RS 232 /RS 422 and user interface providing compatibility with CNC and industrial controllers.

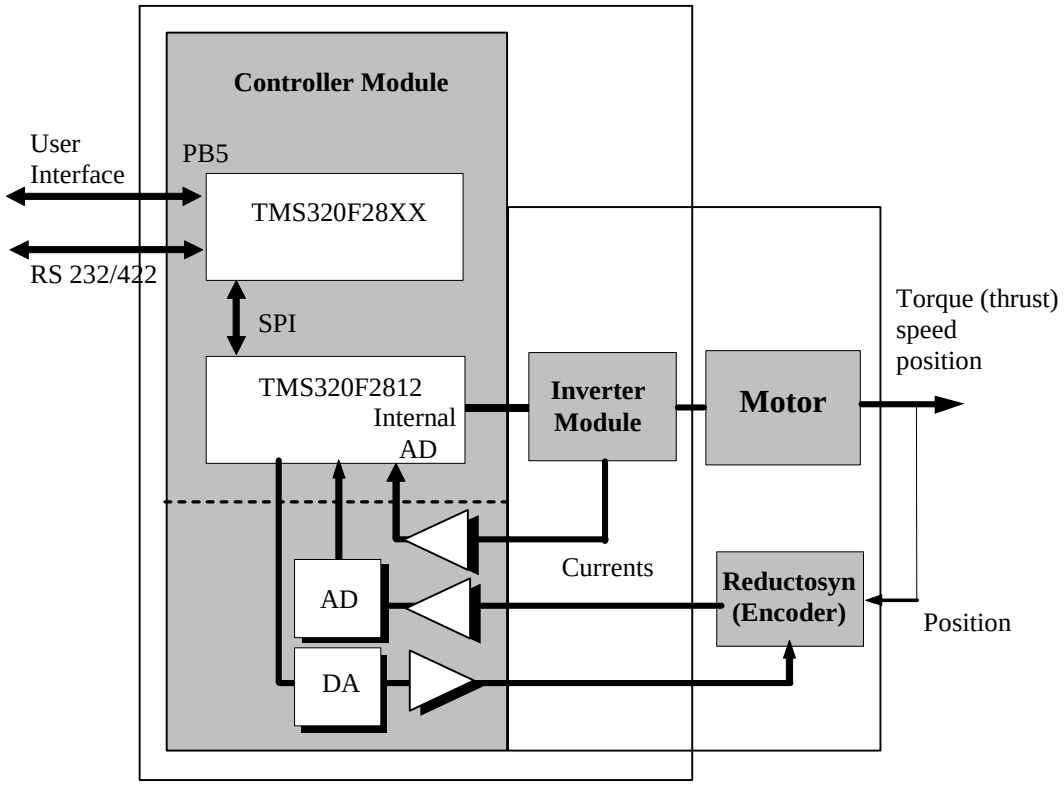

Fig. 1. Digital motion system

Here, one of DSP's is responsible for motion control and the other for communication activity and other implements of motion control, that are current and position digital control also the

PWM generation.

As PWM causes noise in drive system sensors data, the standard method for this noise reduction is to read position and current data in PWM pause. But at the other hand oversampling with afterwards decimation provides antialiasing and also reduces interference. The TMS320F28XX family provides convenient tools for both methods [1]. The processor structure allows to synchronize data input to internal AD converters with PWM pause. Moreover, it's possible to obtain four samples of each of four AD channels in PWM pause. At the other hand, the TMS320F28XX structure allows the asynchronous work of AD converters. In this case one data sample (from four channels) is obtained each 0.8 μs.

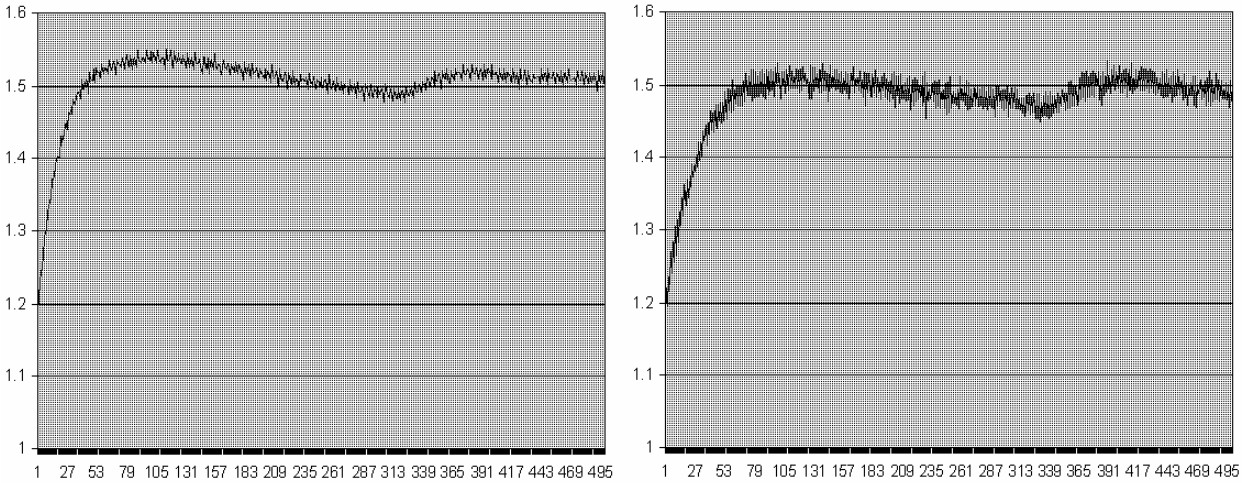

Fig. 2. Current data obtained by oversampling (left) and in PWM pause (right)

Fig. 2 performs current data obtained by oversampling with afterwards decimation and in PWM pause of the inverter module from Fig. 1. The current reference is 1.5 A, inverter DC voltage is 30 V. Obtained in PWM pause data are average of four samples. It's obvious that oversampling shows better results. But with the increase of inverter voltage the results may be different, as the interference due to PWM extremely increases.

References:

[1]. TMS320F28XX Digital Signal Processors Data Manual. 2003. Texas Instruments. Literature Number: SPRS174J

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